UNITED STATES UTILITY PATENT APPLICATION

OF

FRANK DICKINSON

FOR

SPIN CONTROLLING GOLF CLUB IMPACT FACEPLATE

Burns, Doane, Swecker & Mathis, LLP
1737 King Street
P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620
Attorney Docket No. 003534-107

SPIN CONTROLLING GOLF CLUB IMPACT FACEPLATE

Field of the Invention

[0001] The invention relates to improvements in construction of golf club heads and faces for golf clubs such as a putter, iron or driver.

Background of the Invention

[0002] In the game of golf, a ball 1.68 inches in diameter or slightly larger is struck one or more times by clubs comprising a grip, a shaft, and a head to propel it from a tee into a 4 1/4 inch diameter hole in a closely cropped green. The ball is usually struck one or more times with driver type and iron type clubs designed with a low loft to send the a maximum distance in the air towards the green. In these shots, backspin may be desired to enhance the aerodynamic lift of the ball keeping it in the air longer. Alternatively, top-spin may be desired to keep the trajectory low and increase fairway roll when hitting against a strong wind. Side-spin induced by off-center impacts causes the ball to veer left or right in undesired hooking and slicing. Controlled side-spin could mitigate these effects. Upon close approach to the green, highly lofted clubs are used to "chip" the ball near to the hole on the green. Backspin is desired to stop the ball's forward motion near the landing point for precise shot control. On the green, the ball is struck one or more times with a putter which is designed to precisely roll the ball into the hole. When a ball strikes a typical putter face, it skips or slides along the putting surface for a distance before it begins to roll.

If the ball rolled from the first moment of contact, distance and accuracy could be more consistently controlled.

[0003] Since the start of the game, club designers have sought to provide greater control and shot consistency to the player. The primary goal of club design is to control the response of a ball after impact by controlling the ball's initial velocity, launch angle, and spin rate. The typical approach for controlling the spin rate and direction of spin, aside from changing the angle of impact, has generally been, either to increase the amount of friction between the club face and the ball or to change the "hardness" of the striking face. To increase friction, a number of methods have been used, including the application of high-friction coatings, various club face etchings, and curved geometry club faces that can impart a gear-effect spin. To control hardness, various types of metals and other classes of materials have been used. The fundamental idea is that control of the spin rate direction will improve the player's shot and distance control, and thus improve his score.

[0004] Limiting these methods is the USGA, which regulates the design of the club face in several ways. First, the main area of impact of woods and irons may only be made of a single material. Second, the shape and dimensions of the grooves, which are small channels in the club face for the purpose of removing foreign material and providing friction, are tightly controlled dimensionally limiting friction effects. The result has been that club faces are similar in design for almost all models.

[0005] U.S. Patent No. 6,193,615 discloses a golf club constructed to increase the transfer of spin to the ball by increasing the friction between the striking face and the ball.

The front face of the club is a thin plate backed by slots. The dividers between slots are positioned behind the grooves on the front face. When a ball is hit the groove edges are caused to stand out more sharply providing more friction despite grass and water. U.S. Patent No. 5,766,094 discloses a striking face insert having a plurality of cavities to reduce weight of the insert for greater perimeter weighting.

Summary of The Invention

[0006] A golf club such as a putter, iron, or driver is provided with a recess in the club head body striking face. A faceplate is retained in the recess and presents a front impact surface. The faceplate has a volume behind the front impact surface which comprises spin-control elements disposed at an oblique angle to the front surface. These elements influence the compression and rebound of the faceplate, thereby controlling the spin imparted to a golf ball upon impact.

[0007] In a preferred embodiment, a putter is provided with a faceplate insert which causes top-spin and thereby forward roll of the golf ball to begin sooner following impact. This provides a putter with greater control and consistency than the common putter which skips and/or slides a golf ball for a greater distance before roll is initiated by friction on the green.

[0008] The angled spin-control elements may be voids or objects of greater or lesser hardness than the remainder of the faceplate. The elements may have a uniform or varied disposition with respect to the front surface and may lie entirely within the faceplate interior

or terminate at the front or back surface. The elements may be slots, holes, bars, pins, pixels which are set at an angle to the front surface and/or have angled rear end walls, or other forms of voids or objects. The elements may comprise laminated layers of material at an angle to the front surface. There may be more than one layer of elements within the faceplate insert. Upon impact, the deformation and rebound of the faceplate has a vector component parallel to the plane of impact face whereby the rebounding faceplate imparts spin to the golf ball. The spin imparted to a golf ball upon impact may be controlled by the selection and placement of the spin-control elements.

Brief Description of the Drawings

[0009] FIGS. 1 A-C illustrate the operation of a first embodiment of a putter faceplate insert in accordance with the invention.

[0010] FIG. 2 illustrates a putter club head with a faceplate insert.

[0011] FIGS. 3-8 illustrate in cross section through line III-III of FIG. 2 several exemplary embodiments of faceplate inserts for a putter designed to start a ball rolling at impact according to the invention.

[0012] FIG. 9 illustrates a "wedge" type club head with a faceplate insert.

[0013] FIGS. 10-15 illustrate in cross section through line X-X of FIG. 9 several exemplary embodiments of faceplate inserts for iron type clubs designed to increase backspin according to the invention.

[0014] FIG. 16 illustrates a "long" iron club head with a face plate insert.

[0015] FIG. 17 shows a cross-section through line XVII-XVII of FIG. 16 with an exemplary embodiment of a faceplate insert designed to control side-spin according to the invention.

[0016] FIG. 18 illustrates a cross-section through line XVIII-XVIII of FIG. 16.

[0017] FIG. 19 illustrates a driver type club with a faceplate insert designed to counteract gear-effect spin.

[0018] FIG. 20 illustrates a detail of area XX of FIG. 19.

[0019] FIGS. 21-22 illustrate exemplary embodiments of putter inserts designed to impart side-spin to a golf ball upon impact.

[0020] FIGS. 23-24 illustrate a multi-layer faceplate designed to influence backspin and side-spin simultaneously.

Detailed Description of the Invention

[0021] The invention provides an improved golf club head which allows the spin rate and direction of spin of the ball after impact with the club head to be controlled. Specifically, according to the invention, the volume behind the striking face comprises obliquely angled elements. These elements may be voids or objects of hardness greater or lesser than the remainder of the striking plate material. These elements may also be independent pixels with angled ends or laminations of varying hardness set at an angle to the front striking face. Upon impact with a golf ball, the compression and rebound of the impact face is influenced by the angled elements. The result is a striking face that can

impart desired side, back, or top spin on the ball. The invention may be implemented in a golf club head insert wherein a golf club head is provided with a recess in the front striking face. A face plate insert is constructed according to the invention as described below and retained in the recess by a suitable mechanical and/or bonding arrangement. Both the club head body and insert material may be constructed of any suitable metallic and/or polymeric material. Such materials include metals and alloys of varying hardness and various polymers. The faceplate may be grooved and treated by chemical and or mechanical means to provide a rough or polished surface. The club head may further comprise features such as perimeter weighting, sole plates, various shapes and lofts as are desired in club head design.

[0022] FIG. 1 illustrates in cross section a preferred embodiment of a putter head, in accordance with the invention. In the embodiment shown, an elastic polymeric faceplate 1 includes cavities arranged as a series of parallel slots 3 angled with respect to the striking face 8 of the insert. With this arrangement, spin is imparted to a ball in the direction opposite to the angle of the slots. When a ball 4 comes in contact with the club faceplate 1 designed according to this first embodiment of the invention, the striking surface 8 is slightly deformed inward such that the slots 3 are at least partially compressed as shown in FIG. 1B. As the compression energy is released, the striking surface 8 returns in a direction 5 outward and the slots 3 return to their normal shape. The face of the insert in contact with the ball thus imparts a directional spin 6 upon the ball 4 which then leaves the striking surface while immediately rolling on the putting green with the imparted spin.

[0023] With the putters currently common in the art, forward roll of a golf ball is caused by friction between the ball and the putting green only after the ball travels a distance by skipping and sliding on the putting green. A putter head designed according to the present invention imparts top-spin and thereby forward roll from the instant the ball leaves the club head. As a result, enhanced control and consistency can be achieved with the putter according to the invention.

[0024] The invention can also be implemented substituting relatively hard plates or strips for the angled slots 3 and making the surrounding material 2 of the insert and its striking face relatively much softer. The compression and rebound 5 will likewise be at an angle to the plane of the striking face 8, thus imparting a directional spin 6 to the ball. The invention can be implemented in variations of the foregoing embodiment some examples of which are illustrated in subsequent figures.

[0025] FIGS. 2-8 illustrate a putter head 9 and faceplate inserts 1 designed to start a ball spinning at impact in a variety of forms. For example, individual elements called pixels, as disclosed in U.S. Patent 5,807, 090 incorporated herein by reference in its entirety, are known to improve the uniformity of response across the club face. FIG. 3 illustrates in cross section an impact face 8 comprised of soft compressible pixels 12 which have angled back ends 13. The tips of the ends 13 define a back surface of the faceplate which contacts the back wall of the recess at 10 in the club head body. The spaces 11 between pixels at the ends 13 may be voids or filled with a softer material than the pixels 12. The spin effect is achieved by the asymmetric compression and rebound of the exposed

striking surface of each pixel. Likewise, as illustrated in FIG. 4 the invention may be implemented by varying the length and angle of pixels 14 within the insert 1. The back surface 15 of the insert is contiguous with an angled interior wall of the recess. A directional spin is imparted due to the compression and rebound of the angled pixels. The embodiment shown in FIG. 5 is similar to that shown in FIG. 1 except that the material 2 of the insert contains angled elements 3 in the form of solid material such as a softer material, or harder material than the material 2 of the insert 1. FIG. 6, illustrates an insert 1 wherein the elements 17 extend from the striking surface 8. FIG. 7 shows an embodiment wherein the faceplate is comprised of laminated layers of material 16 set at an angle to the front striking face 8 and which may be different polymers or rubber, or metals of varying hardness and elasticity. The striking face 8 may be coated with a layer of polymer or thin metal to provide a uniform surface.

[0026] The spin effect could be imparted through the use of voids in one surface of the club faceplate insert. For example, if angled holes or slots were cut out of the back side of the insert, the effect on the front side of the inset would be for it to move in one direction upon impact, and the opposite direction upon rebound. Likewise pins or holes penetrating the front face will provide an angled compression and rebound. The result would be a spin in the opposite direction of the movement of the impact face. FIG. 8 illustrates angled elements 18, which may be pins, holes, slots, or bars, terminating at the back surface 10 of the insert 1. In any of these embodiments (FIGS. 2-8), the faceplate

material 2 may be exposed or may be fully or partially covered by material such as thin metal or polymer layer.

[0027] The angled elements need not have a specific cross section, for example voids and objects may be polyhedral, oval or elliptical or free-form such as a wavy shape as long as a primary axis (e.g. the long axis of an ellipse or oval) is disposed at an oblique angle to the front surface of the faceplate.

[0028] Iron and driver type clubs may also be provided with spin-controlling impact faceplates according to the invention. FIGS. 9-15 illustrate a chipping wedge type club head 39 and exemplary embodiments of faceplate inserts 31 used to increase backspin for a chipping wedge. The inserts 31 are retained in a recess in a club head body 39 and provide a front striking face 38 and a back surface in contact with the interior wall of the recess at 40 and 45. The inserts may comprise pixels 32 with angled end walls, angled pixels 33, 34, 35, a material with interior angled elements (which may be objects or voids) 33, multi-layer laminated material 36 with the layers disposed at an angle to the front face 38, material with pins or holes 34 extending into the front surface, or pins, holes, slots, or bars 37 extending into the back surface. One skilled in the art will appreciate that variations and combinations of these examples may be used in accordance with the invention.

[0029] FIGS. 16-18 illustrate a long iron type club head 69 having an exemplary insert 61 designed to control side-spin in an off-center impact. The insert 61 has a front striking surface and a back surface 70 which is contiguous with the interior wall of the recess 71 in the club head body 69. In this example, the insert 61 is retained by a dovetail

geometry in the recess. The material 62 of the insert is preferably a highly elastic and durable metal such as NiTi and the angled elements 65, 63 may be voids which are empty or filled with a soft compressible material. The angled elements 65 form a larger angle to the front surface at locations away from the center of the insert than the elements 63 near the center 64. One skilled in the art will appreciate that the variations exemplified in FIGS. 10-15 may also be applied to the control of side-spin when the obliquely angled elements are disposed at an angle to the front surface and to the vertical plane orthogonal to the front surface.

[0030] FIG. 19 illustrates an embodiment of a faceplate insert 81 in cross section which may be used to counteract the gear effect of an off-center hit on a wood type club 89. The club head body 84 may be made of any material suitable for "wood" type clubs, and may further comprise features such as a sole plate and perimeter weighting. The faceplate insert 81 may be made of polymer or metal and the obliquely angled elements 83 may be voids or comprise material of differing hardness. When a golf ball is struck off center with a face plate insert comprising voids at 83, the compression and rebound of the surface will tend to impart spin to the ball in the directions 121,122 opposed to the usual gear effect.

[0031] A putter faceplate may also be designed to correct for off-center hits by imparting side-spin to redirect a golf ball hit off the toe or heel back towards the center line. FIG. 21 illustrates an embodiment of an insert 91 shown in cross section wherein the interior elements are uniformly angled across the width of the insert. An off-center hit

results in a uniform side-spin 131,132. FIG. 22 illustrates an example wherein the interior elements 183 of the faceplate insert 101 are progressively more angled as a function of the distance from the center line. The resulting spin directions 141-146 redirect a golf ball toward the intended line of travel following an off-center impact with the effect increasing progressively as a function of the distance from the center of the faceplate.

[0032] FIGS. 23-24 illustrate a multi-layer faceplate insert 161 in cross section, having a front surface 168 and a back surface 170 and an intermediate division 171, wherein a front layer 164 is designed to impart back spin and comprises angled elements as seen in FIG. 3 and a back layer 162 is designed to control side-spin as in FIGS. 21-22. Additional layers may be implemented, with deeper layers of harder material exerting increasing influence with stronger impacts.

[0033] Any of the above designs may be implemented in combination or comprising other elements such as pixels or bars. While a faceplate insert is preferred, the principles of the invention may be implemented in a faceplate which is integral to the golf club head. The forgoing has described the principles, preferred embodiments and mode of operation of the present invention. However, the invention should not be construed as being limited to the particular embodiments discussed. Thus the above-described embodiments should be regarded as illustrative rather than restrictive, and it should be appreciated that variations may be made in those embodiments by workers skilled in the art without departing from the scope of the present invention as defined by the following claims.